REMARKS

I. Status of Claims

Claims 87-108, and 133-164 are pending in this application. Claims 93, 97-108, 138-140, 147-160, 163, and 164 are withdrawn from consideration as directed to non-elected inventions. Claims 87, 142, and 143 have been amended in accordance with the specification at pages 8, 16, and 23. The scope of the claims remains the same. Applicants submit that the amendments are supported by the specification and do not introduce new matter. As invited by the Examiner (March 9, 2004 Office Action, p. 4) Applicants have further amended the specification to cite the inherent molecular weight of Nipol® EP. No new matter has been introduced by this amendment. *See* M.P.E.P. § 2163.07(a).

Applicants thank the Examiner for withdrawing the previous Section 112 first and second paragraph rejections over claims 89, 135, 136, 138, 139, and 146.

II. Rejection Under 35 U.S.C. §112

The Examiner rejected claims 142 and 143 under 35 U.S.C. §112, first paragraph, for failing to comply with the enablement requirement, and under 35 U.S.C. §112, second paragraph for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. Specifically, the Examiner asserts that there is no basis in the specification for the claimed "number average" molecular weight.

In an earlier Office Action, mailed March 9, 2004, the Examiner rejected these claims on a similar basis, and stated "the documentation of the molecular weight basis

for . . . a particular carboxylated elastomer such as the Nipol® EP (page 16, line 22 and page 23, Table 1) . . . along with its insertion into the appropriate sections of the specification and claims would address the problem." March 9, 2004 Office Action, p. 4. The attached analytical report by Nipon Zeon shows that Nipol® EP has a number average molecular weight of 75,000 and weight average molecular weight of 280,000. Applicants have amended both the specification at page 23 and the claims accordingly. The inherent properties of Nipol® EP, an elastomeric polymer containing carboxylic groups, establishes that the limitations, "has an average molecular weight (number average or weight average) greater than or equal to 2,000 and less than or equal to 1,000,000" and "has an average molecular weight (number average or weight average) greater than or equal to 50,000 and less than or equal to 500,000," are enabled and definite.

Accordingly, Applicants respectfully submit that the amendments render the rejection moot and respectfully request the withdrawal of the rejections of claims 142 and 143 under Section 112.

III. Rejections under 35 U.S.C. §102

The Examiner maintained the rejection of claims 87-91, 94-96, 133-136, and 144-145 under 35 U.S.C. §102(b) as being anticipated by Italian Patent No. 1,245,551 ("the IT '551 patent"), for the reasons stated in the March 9, 2004 Office Action and pages 3-5 of the present Office Action. The Examiner withdrew claims 137 and 146 from this rejection. *Id.* Applicants respectfully traverse this rejection for at least the reasons of record and for the additional reasons presented below.

For anticipation under 35 U.S.C. § 102(b), the reference must teach every aspect of the claimed invention either explicitly or impliedly. *See* MPEP § 706.02, Subsection IV (8th ed., Rev. 2, May 2004). However, Applicants submit that the IT '551 patent does not teach every aspect of independent claim 87, including, inter alia, "an elastomeric polymer containing carboxylic groups crosslinked by reaction with an epoxidized **liquid** organic compound containing at least two epoxide groups located internally on a molecule of the organic compound."

Applicants submit that the epoxidized natural rubber (EPOXIPRENE 50™) discussed in the IT '551 patent on page 10 and page 16, example 5, is not, at a minimum, an epoxidized **liquid** organic compound containing at least two epoxide groups located internally on a molecule of the organic compound.

According to the specification, the liquid organic compounds of the present invention are "products of the hydrocarbon type which are, at room temperature, in the form of viscous liquids or oils." Specification, page 8, lines 28-30. In contrast, the EPOXYPRENE 50™ disclosed in the IT '551 patent is a **solid** compound at room temperature. Indeed, Applicant's acknowledge this fact in the specification at page 38, where EPOXYPRENE 50™ was noted to have an average molecular weight of over 100,000. A person of ordinary skill in the art would recognize that such a high molecular weight is not consistent with a liquid elastomer. *See, e.g.,* specification at page 10, line 35 - page 11, line 2.

Therefore, since the IT '551 patent does not disclose the claimed epoxidized organic liquid compound, as defined in the specification, the Examiner has failed to establish that the prior art discloses all the limitations of the claims. Therefore, the

Examiner has failed to meet the burden for anticipation. Accordingly, Applicants respectfully request that the examiner remove this rejection.

IV. Rejections Under 35 U.S.C. §103

The Examiner maintained the rejection of claims 87-91, 94-96, 133-136, 141-146, 161, and 162 under 35 U.S.C. §103(a) as being obvious over French Patent No. 2,187,808 ("the FR '808 patent"), maintained the rejection of claims 87-92, 94-96, 133-137, 141-146, 161, and 162 under 35 U.S.C. §103(a) as being obvious over Great Britain Patent No. 2,197,654 ("the GB '654 patent"), the article entitled Plastics and Rubber Processing and Applications, by Alex et al. ("the Alex article"), and Japanese Patent No. 10-36563 ("the JP '563 patent") in view of the IT '551 patent, and rejected claims 146, 161, and 162 under 35 U.S.C. §103(a) as being obvious over the JP '563 patent in view of the GB '654 patent and the Alex article.

a. Obviousness Over a Single Reference; the FR '808 Patent

To establish a prima facie case of obviousness under 35 U.S.C. § 103(a) using a single reference, each of three requirements must be met. First, the reference must teach or suggest all of the claim limitations. M.P.E.P. § 2143.03 (8th ed., Rev. 2, May 2004). Second, there must be some suggestion or motivation, either in the reference itself or in the knowledge generally available to one of ordinary skill in the art, to modify the reference in a manner resulting in the claimed invention. M.P.E.P. § 2143.01. Third, there must be a reasonable expectation of success that the proposed modification would work for the intended purpose. M.P.E.P. § 2143.02. Moreover, the

second and third requirements "must both be found in the prior art, not in applicant's disclosure." M.P.E.P. § 2143.

With regard to the FR '808 patent, the Examiner has maintained the previous Section 103(a) rejection from the March 9, 2004 Office Action for the reasons disclosed at pages 5-6 of the present Office Action. Applicants respectfully traverse this rejection for at least the reasons of record and for the additional reasons presented below.

First, the Examiner has not addressed the fact that the FR '808 patent does not disclose an epoxidized liquid organic compound containing at least two **epoxide groups located internally** on the molecule," as recited in the claims. The specification defines epoxide groups located "internally" on the molecule as those having oxirane bridges connecting either: (i) two adjacent carbon atoms located on the main chain, with the condition that neither of the said two adjacent carbon atoms is a terminal carbon atom of the main chain; or (ii) two adjacent carbon atoms located on a side chain. Specification, page 8, line 31 – page 9, line 4. The diepoxide compounds of the FR '808 patent do not have internal epoxide groups, let alone two internal epoxide groups. This is evident from the formula recited on page 3 of the FR '808 patent, which discloses two epoxy groups having the oxirane bridges connecting **the two terminal carbon atoms of the chain**. This feature of the diepoxide compounds of the FR '808 patent eliminates them from being "internal" according to part (i) of the definition in the specification, which is controlling upon the present claims.

Second, the FR '808 patent does not disclose "elastomeric polymer containing carboxylic groups" that are "crosslinked." The Examiner has asserted that the FR '808 patent teaches crosslinking, citing Example 7 and pages 9-10 of the reference.

Applicants respectfully disagree with the Examiner's interpretation of the reference. As stated in both locations of the FR '808 patent, the process that is occurring is transesterification. As explained on page 8 of the reference, by varying the amount of chain **elongation** agent and the **terminal** reactive groups, the result is **chain elongation**. A person of ordinary skill in the art would recognize that extending a chain via transesterification of terminal reactive groups yields a longer chain and does not yield the crosslinking of two chains, which does not occur at the terminal ends of groups.

Therefore, the FR '808 patent does not teach or suggest the claimed limitation that the epoxidized organic compound contains at least two internal expoxide groups and that the elastomeric polymer containing carboxylic groups is crosslinked. Thus, the FR '808 patent does not contain all of the elements of the claims in the present application. As a result, the Examiner has again failed to meet the burden required to establish an obviousness rejection under 35 U.S.C. §103(a). Accordingly, we respectfully request that the Examiner withdraw the rejection.

b. Obviousness Over Multiple References

To establish a prima facie case of obviousness under 35 U.S.C. § 103(a) using multiple references, each of three requirements must be met. First, the references, when combined, must teach or suggest all the claim limitations. M.P.E.P. § 2143.03. Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the references in a manner resulting in the claimed invention. M.P.E.P. §

2143.01. Third, there must be a reasonable expectation of success that the proposed combination would work for the intended purpose. M.P.E.P. § 2143.02. Moreover, the second and third requirements "must both be found in the prior art, not in applicant's disclosure." M.P.E.P. § 2143.

1. The GB '654 Patent, The Alex Article, and The JP '563 Patent in view of the IT '551 Patent.

With regard to the GB '654 patent, the Alex article, and the JP '563 patent in view of the IT '551 patent, the Examiner maintained the previous Section 103(a) rejection from the March 9, 2004 Office Action for the reasons presented on pages 6-7 of the present Office Action. Applicants respectfully traverse this rejection for at least the reasons of record and for the additional reasons below.

While none of these references specifically state that the recited compositions can be used to produce tyres, the Examiner states that these references are all open to the manufacture of "a wide variety of rubber products" from their carboxylated elastomer/epoxidized liquid organic compound blends. *Id.* at 8. Applicants submit, however, that the Examiner has failed to meet the burden to establish a prima facie case of obviousness, at least for the reasons that these references neither disclose all the claimed limitations, nor provide a motivation to combine the references to produce the claimed invention.

First, as discussed above, and incorporated by reference herein, the prior art does not teach all of the claimed limitations. Both the Alex article and the IT '551 patent incorporate the use of EPOXIPRENE 50™. As discussed above, EPOXIPRENE

50™ is not "an epoxidized **liquid** organic compound containing epoxide groups located internally on a molecule of the organic compound."

Second, contrary to the Examiner's rejection in the March 9, 2004 Office Action, the JP '563 patent does not disclose "a compound having 2 or more epoxide groups such as an epoxy-modified silicone oil with at least two internal epoxy groups and a tertiary amine." March 9, 2004 Office Action, p. 7-8. Rather, the figures expressly show on pages 2 – 4 of the JP '563 patent that this compound with 2 or more epoxide groups only permits **terminal** epoxy groups. As discussed above, the specification defines what the claim means when it says "epoxide groups located internally on the molecule;" oxirane bridges connecting either: (i) two adjacent carbon atoms located on the main chain, with the condition that neither of the said two adjacent carbon atoms is a terminal carbon atom of the main chain; or (ii) two adjacent carbon atoms located on a side chain. It is clear from this definition and the figures in the JP '563 patent that the disclosed compounds do not meet the "at least two internal epoxide groups" limitation recited in the claims of the present application.

Third, with respect to the GB '654 patent, in the present Office Action, the Examiner maintained the position that the "crosslinked elastomeric material" is equivalent to the dynamically crosslinked carboxylated butadiene-acrylonitrile elastomer with the epoxidized soybean oil of the GB '654 patent regardless of whether the crosslinked product can be remelted. September 30, 2004 Office Action, p. 6.

However, as disclosed in Applicants' specification, the performance qualities of the crosslinked products for use as tyre rubber compounds must have a substantial constancy of elastic performance qualities over a wide range of working temperatures.

Specification, p.5, lines 1-3. As a result, "the crosslinked compositions according to the present invention show very limited variation in the dynamic elastic modulus as the temperature varies . . . . This property indicates a **lower 'thermoplasticity'** of the crosslinked compositions according to the present invention, . . . and is of fundamental importance when using the compositions in the manufacture of tyres." Specification, p. 29, lines 10-20.

In contrast, the GB '654 patent is directed to thermoplastic compositions, as evidenced, for example, by its title "Thermoplastic Compositions." According to the specification, the disclosed compounds have the advantages of both being an easily processed **thermoplastic elastiomer** and of having the properties of conventional vulcanized rubber. GB '654, p.3. In light of the statement in the present specification that lower thermoplasticity is of fundamental importance, Applicants submit that it would **not** be obvious to a person of ordinary skill in the art to combine the teachings of the GB '654 patent with the other listed prior art to prepare the compositions of the present application. In fact, the GB '654 patent teaches away from any such combination, as the GB '554 patent relates to "Thermoplastic Compositions," when the present application expressly recites that low thermoplasticity is a fundamental requirement of the disclosed compositions. By definition, thermoplastic means "a high polymer that softens when exposed to heat and returns to its original condition when cooled to room temperature." Hawleys, CONDENSED CHEMICAL DICTIONARY, 1093 (14th Ed. 2002) (copy enclosed). Such a property is inconsistent with tyres. Likewise, there would be no motivation for a person of ordinary skill in the art to modify or combine the

"Thermoplastic Compositions" reference with the remaining prior art to produce a composition with "lower thermoplasticity."

In light of the deficiencies of the GB '654 patent, the Alex article, the JP '563 patent, and the IT '551 patent, and the lack of any evidence of record for a motivation to correct these deficiencies, Applicants submit that the Examiner has failed to establish a prima facie case of obviousness. Accordingly, Applicants respectfully request that the Examiner withdraw the obviousness rejection based on these references.

2. The IT '551 patent in view of the FR '808 Patent and the JP '563 patent.

The Examiner rejected claims 146, 161, and 162 under 35 U.S.C. § 103(a) as being obvious over the IT '551 patent in view of the FR '808 and JP '563 patents for the reasons disclosed on page 7 of the Office Action. Applicants respectfully traverse this rejection for at least the reasons below.

As discussed above, and incorporated herein by reference, these prior art references fail to disclose all of the claimed limitations, specifically "an epoxidized **liquid** organic compound containing **at least two** epoxide groups located **internally** on a molecule of the organic compound." Moreover, it is clear that the specific limitations of claims 161 and 162 do not appear in the cited references. Accordingly the Examiner has failed to meet the burden of establishing a Section 103 rejection with respect to these claims, and this rejection should be withdrawn.

V. Conclusion

In view of the foregoing amendments and remarks, Applicants respectfully request reconsideration of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to Deposit Account No. 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

Dated: January 31, 2005

By: _____
Anthony A. Hartmann
Reg. No. 43,662

Attachment: Analytical Report by Nippon Zeon of Nipol EP 1072
Hawleys, CONDENSED CHEMICAL DICTIONARY, 1093 (14th Ed. 2002)

—Original Message—
From: MusciR@[redacted].com [SMTP:MusciR@[redacted].com]
Sent: Monday 17 May 2004 23:40
To: Sesia Antonio, IT; Nahmias Marco, IT
Subject: 17.05.2004 - Informazioni su Nipol NX775 e Nipol 1072

Come da Vs. richiesta Vi invio le informazioni disponibili su Nipol 1072 e Nipol NX775.

The Carboxyl content of the 1072 and NX775 is approx. 7% .

Nipol 1072:

ZEON R&D Analytical Report

Subject: Molecular Weight Distribution of 1072
Authors: Cleta Rackers
Co-Authors:
Requested By: Paul Rau

Report Date:
11/16/2000

Report Number: GPC00155 Counter: 2262

(Embedded image moved to file: pic25705.jpg)
Body of Document:

OBJECTIVE:

To determine the molecular weight distributions of two lots of 1072

RESULTS:

Molecular weight averages are based upon polystyrene in THF.

Sample ID	Anal. ID	Mn	Mw	Mz	Mw/Mn
N57-155-1; 1EOH398-14	155-1	7.5 x 104	2.9 x 105	9.0 x 105	3.9
N57-155-2; N0173	155-2	7.5 x 104	2.7 x 105	8.0 x 105	3.6

Mz = Z average molecular weight
Mw = weight average molecular weight

Mn = number average molecular weight
Mw/Mn = polydispersity

DISCUSSION OF THE RESULTS:

The samples were prepared by dissolving ~20 mg in 30 gms of THF. Prior to analysis, the solutions were filtered through a 0.45 PTFE filter. Both of the solutions passed through the filter suggesting that all of the entire polymer samples were analyzed.

Copies of the molecular weight distributions for each of the polymers are attached to the hard copy of this report being mailed to you.

EXPERIMENTAL CONDITIONS:

HPLC: Waters 600E solvent delivery system and a 700 WISP autosampler.
Mobile Phase: THF
Flow Rate: 1.0 ml/min
GPC Columns: 7.8 x 300 mm 106 Å Ultrasyragel - 7micron particle size
7.8 x 300 mm 105 Å Ultrasyragel - 7 micron particle size
7.8 x 300 mm 104 Å Ultrasyragel - 7 micron particle size
Detector: Model 410 RI sensitivity set a 128 columns & detector at 35C
Sample Volume: 200 microliters
Data System: Millenium 32

Nipol NX775:
ZEON R&D Analytical Report

Subject: Molecular Weight Distribution of NX775 Polymers
Authors: Cleta Rackers
Co-Authors:
Requested By: Paul Ran

Report Date:
02/18/2000

Report Number: GPC001/2 Counter: 1736

(Embedded image moved to file: pic06962.jpg)
Body of Document:

OBJECTIVE:

To determine the molecular weight distributions of six lots of NX775 polymers.

RESULTS:

Molecular weight averages are based upon polystyrene in THF.

Hawley's

Condensed Chemical Dictionary

Fourteenth Edition

Revised by

Richard J. Lewis, Sr.

JOHN WILEY & SONS, INC.

This book is printed on acid-free paper. ∞

Library of Congress Cataloging-in-Publication Data:

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Printed in the United States of America.

10 9 8 7 6 5 4 3 2

in household thermometers. Mercury thermometers ranging up to 600C are available; the mercury is prevented from vaporizing by a pressurized inert gas inserted above the mercury column. Metal protection tubes for stem and bulb are necessary. The softening point of the glass is of primary importance; borosilicate glasses are satisfactory up to 500C, but Jena glass is required for higher temperatures. Minimum and maximum thermometers are so made as to retain their lowest and highest readings indefinitely; the latter are used for oil-well and other geothermal measurements.

There are several other types of thermometers: (1) Gas in which either the pressure at constant volume or the volume at constant pressure measure the temperature; these are used for extremely accurate thermodynamic determinations. The gases used are helium, nitrogen, and hydrogen. (2) Bimetallic, in which the sensing element consists of two strips of metals having different expansion coefficients; its range is from −185 to 425C. (3) Thermoelectric (thermocouple), in which measurement is made by the electromotive force generated by two dissimilar metals; its range is from −200 to 1800C. (4) Resistance, in which temperature is measured by change in the electrical resistance of a metal, usually platinum; its range is from −163 to 660C. (5) An optical fiber thermometer developed by NBS Center for Chemical Engineering has a range of up to 2000C. It is made from a single crystalline sapphire and is much more accurate than the existing standard. Based on fundamental radiation principles, it measures thermodynamic temperatures directly. See thermocouple; bimetal.

thermonuclear reaction. See fusion.

thermoplastic. A high polymer that softens when exposed to heat and returns to its original condition when cooled to room temperature. Natural substances that exhibit this behavior are crude rubber and a number of waxes; however, the term is usually applied to synthetics such as polyvinyl chloride, nylons, fluorocarbons, linear polyethylene, polyurethane prepolymer, polystyrene, polypropylene, and cellulosic and acrylic resins.
See thermoset.

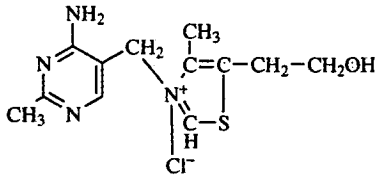
thermoset. A high polymer that solidifies or "sets" irreversibly when heated. This property is usually associated with a cross-linking reaction of the molecular constituents induced by heat or radiation, as with proteins, and in the baking of doughs. In many cases, it is necessary to add "curing" agents such as organic peroxides or (in the case of rubber) sulfur. For example, linear polyethylene can be cross-linked to a thermosetting material by either radiation or chemical reaction. Phenolics, alkyds, amino resins, polyesters, epoxides, and silicones are usually considered to be thermosetting, but the term also applies to materials in which additive-induced cross-linking is possible, e.g., natural rubber.

THF. Abbreviation for tetrahydrofuran.

thia-. Prefix indicating the presence of sulfur in a heterocyclic ring.

thiabendazole. (4-[2-benzimidazolyl]thiazole). CAS: 148-79-8. $C_{10}H_7N_3S$.
Properties: White to tan crystals. Mp 304C. Slightly soluble in water, alcohols, and chlorinated hydrocarbons; soluble in dimethylformamide.
Use: Fungicide effective on citrus fruits, anthelmintic.

thiamine. (3-(4-amino-2-methylpyrimidyl-5-methyl)-4-methyl-5, β-hydroxy-ethylthiazolium chloride; vitamin B_1). $C_{12}H_{17}ClN_4OS$. The antineuritic vitamin, essential for growth and the prevention of beriberi. It functions in intermediate carbohydrate metabolism in coenzyme form in the decarboxylation of α-keto acids. Deficiency symptoms: emotional hypersensitivity, loss of appetite, susceptibility to fatigue, muscular weakness, and polyneuritis.



Source: Enriched and whole-grain cereals, milk, legumes, meats, yeast. Most of the thiamine commercially available is synthetic.
Use: Medicine, nutrition, enriched flours. Isolated usually as the chloride (see formula above). Available as thiamine hydrochloride and thiamine mononitrate.

1,4-thiazane.

$CH_2SCH_2CHNHCH_2$.
Properties: Colorless liquid; pyridine-like odor. Bp 169C (758 mm Hg). Fumes in air. Absorbs carbon dioxide from the air. Soluble in alcohol, benzene, ether, water. Combustible.
Derivation: Interaction of alcoholic ammonia and dichlorodiethyl sulfide.
Grade: Technical.
Use: Organic synthesis.

thiazole.
CAS: 288-47-1.

SCH:NCH:CH.
Properties: Colorless or pale-yellow liquid; odor resembles that of pyridine. D 1.18, bp 116.8C. Soluble in alcohol and ether; slightly soluble in water.
Use: Organic synthesis of fungicides, dyes, and rubber accelerators.